Comprehension IV

When the Bayer's process is used for recovering aluminium from siliceous ores, some aluminium is always lost because of the formation of an unworkable mud having the following average formula: $3Na_2O \cdot 3Al_2O_3 \cdot 5SiO_2 \cdot 5H_2O$. Since aluminium and sodium ions are always in excess in the solution from which this precipitate is formed, the precipitation of the silicon in the mud is complete. A certain ore contains 13% (by weight) Kaolin, $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$ and 87% gibbsite, $Al_2O_3 \cdot 3H_2O$. ($Al = 27$, $Si = 28$)

10. What per cent of the total aluminium in this ore is recoverable in the Bayer's process?
- (a) 80
- (b) 90
- (c) 85
- (d) 75

11. What is the percentage of silica present in the ore, by weight?
- (a) 2.82
- (b) 3.02
- (c) 0.465
- (d) 6.05

12. How many moles of Al_2O_3 are present per mole of ore?
- (a) 1.000
- (b) 0.083
- (c) 0.222
- (d) 0.242

Comprehension V

Vitamin C ($M = 176$) is a compound of C, H and O found in many natural sources, especially citrus fruits. When a 1.0 g sample of vitamin C is placed in a combustion chamber and burned, the following data are obtained:

Mass of CO_2 absorber after combustion = 85.35 g
Mass of CO_2 absorber before combustion = 83.85 g
Mass of H_2O absorber after combustion = 37.96 g
Mass of H_2O absorber before combustion = 37.55 g

13. What is the percentage of carbon, by wt. in vitamin C?
- (a) 66.67%
- (b) 40.9%
- (c) 20%
- (d) 60%

14. What is the percentage of hydrogen, by wt. in vitamin C?
- (a) 4.55%
- (b) 41%
- (c) 20.5%
- (d) 9.11%

15. What is the empirical formula of vitamin C?
- (a) CH_2O
- (b) $C_3H_4O_3$
- (c) $C_6H_8O_6$
- (d) CHO